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ABSTRACT

The Piagetian perspective of adult cognitive development and adult education could have implications for how work and formal reasoning can be related to adult education programs and policy. During adolescence and adulthood, many individuals enter the cognitive period of formal operations (the last of three stages in Piaget's conceptual framework of cognitive development) and thus become able to think in a hypothetico-deductive manner, to discern proportionalities, and to generate all the combinations among factors in a systematic manner. However, research has established that formal reasoning tends to occur solely in modern technological societies and only among 30% of the adults in those populations. Formal reasoning becomes especially important in a complex democracy such as America, because ideally citizens should be independent decisionmakers capable of assessing complicated issues affecting the country. Related to that is the issue that some forms of work encourage and support formal reasoning skills and other forms of work depress or inhibit formal reasoning development. Consequently, one function of adult education can then be to foster the development of formal reasoning among adults either in building on positive cognitive effects of some career experiences or in counteracting negative cognitive effects of other work experiences. (SH)

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Piagetian Cognitive Theory and Adult Education: A Perspective for Research

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Jean Piaget formulated a conceptual framework for the psychology of cognitive development that posited three major cognitive periods: the period of sensori-motor operations, the period of concrete operations, and the period of formal operations. His research productivity exceeds that of 450 books and articles and his framework has engendered at least 50% of all the research done on cognitive development if one considers all the studies done on conservation concepts, classification, etc. Without question, his psychological theory has been the most fertile and seminal framework yet developed in developmental psychology and it has had profound implications for educational preactices as educators have become sensitive to the changing cognitive capabilities of students.

But Piaget studied primarily children and adolescents. What about adults and their cognitive development? Does the extremely integrative and generative Piagetian framework have anything to contribute to the study of adult cognitive development and adult education? Although Piaget has written very little on adulthood, I strongly believe that the answer to the last two questions is "yes" and, in this paper, I will argue for that position.

Two Approaches to the Study of Adult Education

As the population of adults grows dramatically in the next decade in the United States, there will be a marked increase in the study of adult psychological development and adult education theory and practice. Already it is generally accepted that substantial changes in intellectual development in adulthood are possible (e.g., Horn and Donaldson, 1976; Boltes and Schaie, 1976). To study adult cognition and the resulting educational consequences, two basic approaches can be considered.

In one approach, one begins with the society as it is now with its socio-economic order, with its occupational needs, with its array of economic opportunities and available jobs, etc. The task of the researcher in adult cognition is to analyze then the nature of expertise in professions that have been deemed important in society and to formulate instructional experiences that will effect such expertise in interested students in the adult population. Since so much is interpreted in terms of cost-benefit ratios, the adult cognition researcher will tend to

analyze job expertise in highly marketable occupations such as medical science and law rather than in less marketable occupations such as poetry and astronomy. The analysis of job expertise will reveal many interesting facets of adult cognition (e.g., the extraordinary range of cognitive capabilities adults can manifest); however, there is the danger that the study of adult cognition and adult education could become excessively influenced and regulated by the economic sector of society and that our understanding of adult cognition and adult education will be fragmented and lack comprehensiveness.

The second approach starts with a conception of what cognitive capabilities will tend to optimize the adaptibility of an adult in the physical as well as socio-cultural environment. Piaget has provided such a conception in the form of formal operations. During adolescence and adulthood, many individuals enter the cognitive period of formal operations and thus become able to think in a hypothetico-deductive manner, to reason abstractly and to make theories, to discern proportionalities and balancing of forces in situations, to generate all the combinations among factors in a situation in a systematic and non-redundant manner, and to be able to calculate simple probabilities of events. The formal reasoner can think abstractly and about possible situations. Full operational reasoning then, consists of formal reasoning and concrete reasoning skills such as classification, seriation, and conservation of physical concepts and is most likely necessary to adapt to the complexities of a modern technological society.

Within the second approach, there is an ideal cognitive order posited for the adult that is quasi-free--i.e., to a great extent, valid for adaptation in many societies and not determined by any one society. The task of the researcher in adult cognition is to determine the cognitive effects of vocational education, work, and other long-term experiences on adults and to determine how long-term experiences affecting adults can be constituted so as to contribute to the intellectual development of the adult learner. One goal of adult education then becomes the promotion of operational reasoning capabilities of adult learners.

Formal Reasoning and Adult Education

Research has established that formal reasoning tends to occur solely in modern technological societies and only among 30% of the adults in those populations (Neimark, 1975). Formal reasoning is an adaptation primarily to the demands of the socio-cultural environment which are symbolically transmitted, abstractly presented, and often posed by distant social groups and institutions.

Formal reasoning becomes especially important in a complex democracy such as America, because ideally citizens should be independent decision-makers capable of assessing complicated issues affecting the country. Related to that is the issue that long-term experiences in adulthood such as various forms of work encourage and support formal reasoning skills and other forms of work depress or inhibit formal reasoning development. One function of adult education can then be to foster the development of formal reasoning among adults either in building on positive cognitive effects of some career experiences or in counteracting negative cognitive effects of other work experiences.

In relation to the effect of schooling on Piagetian cognitive processes, Goodnow and Bethon (1966) determined that schooling can have a positive effect on the development of formal reasoning as schooled American adolescents performed well on a combinatorial reasoning task, whereas unschooled Chinese adolescents did not perform well with the same task. Kuhn (1976) has suggested that to the extent to which the environment promotes exploratory cognitive activity Piagetian intelligence is developed and supported. Research on the effects of schooling on Piagetian intelligence has been based on children and young adolescents. No research has yet been completed on the effects of types of vocational education on Piagetian intelligence for older adolescents and adults.

Presently, we are conducting a study on the effects of nursing experience and education on formal reasoning capabilities of adults. It is hypothesized that nursing experience and education will have a convergent effect on the profiles of formal reasoning capabilities of adults. It is expected that first-year undergraduate

nursing students will have a greater variation among their formal reasoning task profiles than first-year graduate nursing students will have. Five formal reasoning tasks are being administered to each of 60 nursing students individually with two raters being present. This research is an example of a study on adult education from a Piagetian framework and complying to the second approach to the study of adult education.

Anotner line of inquiry that should be pursued is the conception of the "formal operational" teacher as formulated by Mertens (1977). A formal operational teacher is one who for example, is able to recognize various alternative explanations to account for situations and to adopt points of view of students. It is entirely possible that in order for formal reasoning to be promoted in adult education settings, formal operational teachers may be necessary. This issue is worthy of empirical examination.

Conclusion

Piaget (1972) recognized that the aptitudes of individuals differentiate progressively with age, but reconciled that fact with his conception of highly generalizable cognitive capabilities by stating that people can enter into life situations which reinforce some specific abilities and not others, thus contributing to differentiation of special abilities between subjects although general cognitive period capabilities may be shared. He encouraged that researchers study the actual processes of cognitive differentiation that takes place in late adolescence and adulthood--i.e., "whether the same structures are sufficient for the organization of many varying fields of activity but with differences in the way they are applied or whether there will appear new and special structures that still remain to be discovered and studied." (Piaget, ibid.). The research on the effects of vocational education and work on operational reasoning capabilities of adults proposed in this paper would constitute a vital part of the research enterprise proposed by Piaget.

Operating from a Piagetian perspective, the researcher in adult education would hopefully consider the goal for adult education of promoting formal and operational reasoning in adults to become a goal for society in general. From this point of view, all long-term recurring experiences in adulthood such as work and leisure should become whenever possible, occasions for the promotion of operational reasoning capabilities. The adult educator should expose cognitively inhibiting situations affecting adults wherever they may exist and encourage cognitively contributive situations.

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